UNITED STATES PATENT APPLICATION

FOR

METHODS AND SYSTEMS FOR DIRECTORY INFORMATION LOOKUP

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DESCRIPTION

Related Applications

[001]   This application is a continuation-in-part of U.S. Patent Application No. 10/083,793, entitled "METHOD AND APPARATUS FOR CALENDARED COMMUNICATIONS FLOW CONTROL," filed February 27, 2002, Attorney Docket No. 01-1007; U.S. Patent Application No. 10/083,792, entitled "VOICE MAIL INTEGRATION WITH INSTANT MESSENGER," filed February 27, 2002, Attorney Docket No. 01-1001; U.S. Patent Application No. 10/083,884, entitled "DEVICE INDEPENDENT CALLER ID," filed February 27, 2002, Attorney Docket No. 01-1002; and U.S. Patent Application No. 10/083,822, entitled "METHOD AND APPARATUS FOR A UNIFIED COMMUNICATION MANAGEMENT VIA INSTANT MESSAGING," filed February 27, 2002, Attorney Docket No. 01-1004, all of which claim priority to U.S. Provisional Patent Application Nos. 60/272,122, 60/272,167, 60/275,667, 60/275,719, 60/275,020, 60/275,031, and 60/276,505, and all of which are expressly incorporated herein by reference in their entirety.

[002]   Applicants also claim the right to priority under 35 U.S.C. § 119(e) based on Provisional Patent Application No. 60/428,704, entitled "DIGITAL COMPANION," filed November 25, 2002; and Provisional Patent Application No. 60/436,018, entitled "DIGITAL COMPANION," filed December 26, 2002, both of which are expressly incorporated herein by reference in their entirety.

[003]   The present application also relates to U.S. Patent Application No. 10/084,121, entitled "CALENDAR-BASED CALLING AGENTS," filed February 27, 2002, Attorney Docket No. 01-1008; U.S. Patent Application No. (_____),

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entitled "METHODS AND SYSTEMS FOR DRAG AND DROP CONFERENCE CALLING," Attorney Docket No. 03-1012; U.S. Patent Application No. (_____), entitled "METHODS AND SYSTEMS FOR CONFERENCE CALL BUFFERING," Attorney Docket No. 03-1013; U.S. Patent Application No. (_____), entitled "METHODS AND SYSTEMS FOR COMPUTER ENHANCED CONFERENCE CALLING," Attorney Docket No. 03-1014; U.S. Patent Application No. (_____), entitled "METHODS AND SYSTEMS FOR REMOTE CALL ESTABLISHMENT," Attorney Docket No. 03-1015; U.S. Patent Application No. (_____), entitled "METHODS AND SYSTEMS FOR CALL MANAGEMENT WITH USER INTERVENTION," Attorney Docket No. 03-1016; U.S. Patent Application No. (_____), entitled "METHODS AND SYSTEMS FOR AUTOMATICALLY FORWARDING CALLS TO CELL PHONE," Attorney Docket No. 03-1018; U.S. Patent Application No. (_____), entitled "METHODS AND SYSTEMS FOR ADAPTIVE MESSAGE AND CALL NOTIFICATION," Attorney Docket No. 03-1019; U.S. Patent Application No. (_____), entitled "METHODS AND SYSTEMS FOR A CALL LOG," Attorney Docket No. 03-1020; U.S. Patent Application No. (_____), entitled "METHODS AND SYSTEMS FOR AUTOMATIC FORWARDING OF CALLS TO A PREFERRED DEVICE," Attorney Docket No. 03-1021; U.S. Patent Application No. (_____), entitled "METHODS AND SYSTEMS FOR MULTI-LINE INTEGRATED DEVICE OR LINE MANAGEMENT," Attorney Docket No. 03-1022; U.S. Patent Application No. (_____), entitled "METHODS AND SYSTEMS FOR CONTACT MANAGEMENT," Attorney Docket No. 03-1023; U.S. Patent Application No.

(_____), entitled "METHODS AND SYSTEMS FOR NOTIFICATION OF CALL TO PHONE DEVICE," Attorney Docket No. 03-1024; U.S. Patent Application No. (_____), entitled "METHODS AND SYSTEMS FOR SINGLE NUMBER TEXT MESSAGING," Attorney Docket No. 03-1025; U.S. Patent Application No. (_____), entitled "METHODS AND SYSTEMS FOR MULTI-USER SELECTIVE NOTIFICATION," Attorney Docket No. 03-1026; U.S. Patent Application No. (_____), entitled "METHODS AND SYSTEMS FOR CPN TRIGGERED COLLABORATION," Attorney Docket No. 03-1027; and U.S. Patent Application No. (_____), entitled "METHODS AND SYSTEMS FOR PREEMPTIVE REJECTION OF CALLS," Attorney Docket No. 03-1028, all of which are expressly incorporated herein by reference in their entirety.

Technical Field

[004]   The present invention generally relates to communication systems and, more specifically, to methods and systems for obtaining directory information.

Background

[006]   A wide variety of means exist for communication between users. For example, a user may conduct phone calls via a home phone, work phone, and mobile phone. In addition, users may also communicate using devices such as PC's, PDA's, pagers, etc. using manners of communicating as email and instant messaging.

[007]   Unfortunately, managing such a wide variety of communication means can be difficult. In particular, as a user changes location, communication with the user may vary. For example, while on travel, it may only be possible to reach a user

by mobile phone. However, the user may best be reached by email while at work. Also, the user may wish to implement various rules for receiving and controlling communications. For example, to be reached at home, the user may want the home phone to ring three times before forwarding the call to a mobile phone. As another example, the user may wish to be paged each time an email is received from a particular person while away from the office.

[008] Typically, to implement communication management, a person must individually manage each communication device separately. Thus, when the user wishes to change how communication is managed, the user may have to deal with numerous devices and, perhaps, service centers.

[009] Further, conventional systems offer limited incoming call management options. One common option in conventional systems is "Caller ID," which enables a receiving party to view a calling party's telephone number. Some systems, (e.g., digital cell phones) automatically store all incoming calls in a rolling list as they are received. However, such systems typically provide limited FIFO storage and usually store only the received numbers. Further, current systems do not allow users to retrieve contact information from a calling party number on demand and to add contact information to a contact list. Also, with current systems, users cannot easily select a listing from multiple listings.

[010] Methods, systems, and articles of manufacture consistent with certain embodiments of the present invention are directed to obviating one or more of the issues set forth above.

SUMMARY

[011] Systems and methods consistent with the present invention may obtain contact information associated with a party using an identifier (e.g., a telephone number). In certain embodiments consistent with the present invention, systems and methods may receive a request for contact-related information associated with a party. Consistent with principles of the present invention, the request may include an identifier associated with the party. The identifier for which contact information is requested may be a telephone number received by a user (e.g., a calling party number), previously dialed by the user (e.g., from an outgoing call history or log), and/or specified by the user. The identifier could also include an e-mail address, an instant messenger address, a photograph, etc. The request for contact information may be initiated by a user and/or a device associated with the user. Methods and systems may retrieve contact-related information associated with the party using the identifying information. Methods and systems may leverage one or more networks to retrieve the contact-related information. In certain embodiments of the present invention, systems and methods may transmit a query that includes the identifier to a data operations center, which, in response, may retrieve and provide contact information. A user may access the contact information via, for example, a user terminal. In certain implementations, systems and methods consistent with the present invention may obtain contact information in order to add a contact to a user's address book or contact list.

[012] Both the foregoing and the following descriptions are exemplary and explanatory only and are not intended to limit the claimed invention in any manner whatsoever.

BRIEF DESCRIPTION OF THE DRAWINGS

[013] The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate exemplary embodiments of the invention and, together with the description, serve to explain principles of the invention. In the drawings:

[014] Fig. 1 is a diagram of an exemplary data processing and telecommunications environment in which features and aspects consistent with the principals of the present invention may be implemented;

[015] Fig. 2 is a diagram of an exemplary user terminal, consistent with the principals of the present invention;

[016] Fig. 3 is a diagram of a voice network, consistent with the principles of the present invention;

[017] Fig. 4 is a block diagram of a service center, consistent with the principles of the present invention;

[018] Fig. 5 illustrates a logical architecture of an exemplary system, consistent with the present invention;

[019] Fig. 6 is a diagram illustrating an environment in which features and aspects consistent with certain embodiments of the present invention may be implemented;

[020] Fig. 7 is a flowchart depicting stages of a method consistent with certain embodiments of the present invention;

[021] Fig. 8 illustrates exemplary information which may be communicated by elements of the environment depicted in Fig. 6 in certain embodiments of the present invention; and

[022] Figs. 9A and 9B illustrate example programming code consistent with certain embodiments of the present invention.

DETAILED DESCRIPTION

[024] Reference will now be made in detail to exemplary embodiments of the present invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers will be used throughout the figures to refer to the same or like elements. The accompanying figures illustrate exemplary embodiments and implementations consistent with the present invention, but the description of those embodiments does not indicate or imply that other embodiments or implementations do not fall within the scope of present invention. It is to be understood that other implementations may be utilized and that structural and method changes may be made without departing from the scope of present invention.

[025] Fig. 1 is a block diagram of a data processing and telecommunications environment 100, in which features and aspects consistent with the present invention may be implemented. The number of components in environment 100 is not limited to what is shown and other variations in the number of arrangements of components are possible, consistent with embodiments of the invention. The components of Fig. 1 may be implemented through hardware, software, and/or firmware. Data processing and telecommunications environment 100 may include a data network 102, a voice network 104, and a service center 106. A user 110 may use a user terminal 112 to interface with data network 102 and may use phones 114,

116, and 118 to interface with voice network 104. Calling party 120 may use phone 122 to call a user, such as user 110, at any one of phones 114, 116, and 118.

[026] Data network 102 provides communications between the various entities depicted in environment 100 of Fig. 1, such as user terminal 112 and service center 106. Data network 102 may be a shared, public, or private network and encompass a wide area or local area. Data network 102 may be implemented through any suitable combination of wired and/or wireless communication networks. By way of example, data network 102 may be implemented through a wide area network (WAN), local area network (LAN), an intranet and/or the Internet. Further, the service center 106 may be connected to multiple data networks 102, such as, for example, to a wireless carrier network and to the Internet.

[027] Voice network 104 may provide telephony services to allow a calling party, such as calling party 120, to place a telephone call to user 110. In one embodiment, voice network 104 may be implemented using a network, such as the Public Switched Telephone Network ("PSTN"). Alternatively, voice network 104 may be implemented using voice-over Internet Protocol ("VoIP") technology. In addition, voice network 104 may be implemented using both PSTN and VoIP technology consistent with the principles of the present invention. Further, service center 106 may be connected to multiple voice networks 104, such as for example, Verizon's™ Voice Network, voice networks operated by other carriers, and wireless carrier networks.

[028] Service center 106 provides a platform for managing communications over data network 102 and voice network 104. Service center 106 also provides

gateway functions, such as code and protocol conversions, to transfer communications between data network 102 and voice network 104. Service center 106 may be implemented using a combination of hardware, software, and/or firmware. For example, service center 106 may be implemented using a plurality of general purpose computers or servers coupled by a network (not shown). Although service center 106 is shown with direct connections to data network 102 and voice network 104, any number and type of network elements may be interposed between service center 106, data network 102, and voice network 104.

[029] User terminal 112 provides user 110 an interface to data network 102. For example, user terminal 112 may be implemented using any device capable of accessing the Internet, such as a general purpose computer or personal computer equipped with a modem. User terminal 112 may also be implemented in other devices, such as the Blackberry™, and Ergo Audrey™. Furthermore, user terminal 112 may be implemented in wireless devices, such as pagers, mobile phones (with data access functions), and Personal Digital Assistants ("PDA") with network connections.

[030] User terminal 112 also allows user 110 to communicate with service center 106. For example, user 110 may use instant messaging ("IM") to communicate with service center 106. In addition, user terminal 112 may use other aspects of TCP/IP including the hypertext transfer protocol ("HTTP"); the user datagram protocol ("UDP"); the file transfer protocol ("FTP"); the hypertext markup language ("HTML"); and the extensible markup language ("XML").

[031] Furthermore, user terminal 112 may communicate directly with service center 106. For example, a client application may be installed on user terminal 112, which directly communicates with service center 106. Also, user terminal 112 may communicate with service center 106 via a proxy.

[032] Phones 114, 116, 118, and 122 interface with voice network 104. Phones 114, 116, 118, and 122 may be implemented using known devices, including wireline phones and mobile phones. Although phones 114, 116, 118, and 122 are shown directly connected to voice network 104, any number of intervening elements, such as a private branch exchange ("PBX"), may be interposed between phones 114, 116, 118, and 122 and voice network 104.

[033] Fig. 2 is a block diagram of a user terminal consistent with the present invention. User terminal 112 includes a central processing unit (CPU) 200, a memory 202, a storage module 204, a network interface 206, an input interface 208, an output interface 210, an input device 216, and an output device 218.

[034] CPU 200 provides control and processing functions for user terminal 112. Although Fig. 2 illustrates a single CPU, user terminal 112 may include multiple CPUs. CPU 200 may also include, for example, one or more of the following: a co-processor, memory, registers, and other processing devices and systems as appropriate. CPU 200 may be implemented, for example, using a Pentium™ processor provided from Intel Corporation.

[035] Memory 202 provides a primary memory for CPU 200, such as for program code. Memory 202 may be embodied with a variety of components of subsystems, including a random access memory ("RAM") and a read-only memory

("ROM"). When user terminal 112 executes an application installed in storage module 204, CPU 200 may download at least a portion of the program code from storage module 204 into memory 202. As CPU 200 executes the program code, CPU 200 may also retrieve additional portions of program code from storage module 204.

[036] Storage module 204 may provide mass storage for user terminal 112. Storage module 204 may be implemented with a variety of components or subsystems including, for example, a hard drive, an optical drive, CD ROM drive, DVD drive, a general-purpose storage device, a removable storage device, and/or other devices capable of storing information. Further, although storage module 204 is shown within user terminal 112, storage module 204 may be implemented external to user terminal 112.

[037] Storage module 204 includes program code and information for user terminal 112 to communicate with service center 106. Storage module 204 may include, for example, program code for a calendar application, such as GroupWise provided by Novell Corporation or Outlook provided by Microsoft Corporation; a client application, such as a Microsoft Network Messenger Service (MSNMS) client or America Online Instant Messenger (AIM) client; and an Operating System (OS), such as the Windows Operation System provided by Microsoft Corporation. In addition, storage module 204 may include other program code and information, such as program code for TCP/IP communications; kernel and device drivers; configuration information, such as a Dynamic Host Configuration Protocol (DHCP) configuration; a web browser, such as Internet Explorer provided by Microsoft

Corporation, or Netscape Communicator provided by Netscape Corporation; and any other software that may be installed on user terminal 112.

[038] Network interface 206 provides a communications interface between user terminal 112 and data network 102. Network interface 206 may receive and transmit communications for user terminal 112. For example, network interface 206 may be a modem, or a local area network ("LAN") port.

[039] Input interface 208 receives input from user 110 via input device 212 and provides the input to CPU 200. Input device 212 may include, for example, a keyboard, a microphone, and a mouse. Other types of input devices may also be implemented consistent with the principles of the present invention.

[040] Output interface 210 provides information to user 110 via output device 214. Output device 214 may include, for example, a display, a printer, and a speaker. Other types of output devices may also be implemented consistent with the principles of the present invention.

[041] Fig. 3 is a diagram of a voice network, consistent with the principles of the present invention. As shown, voice network 104 includes an intelligent service control point (ISCP) 302, service transfer points (STP) 304 and 306, service switching points (SSP) 308 and 310, a line information database (LIDB) 312, an ISCP Service Provisioning And Creation Environment (SPACE) 314, a Recent Change Environment 316, and an Intelligent Peripheral (IP) 320.

[042] Voice network 104 may be implemented using the PSTN and SS7 as a signaling protocol. The SS7 protocol allows voice network 104 to provide features, such as call forwarding, caller-ID, three-way calling, wireless services such as

roaming and mobile subscriber authentication, local number portability, and toll-free/toll services. The SS7 protocol provides various types of messages to support the features of voice network 104. For example, these SS7 messages may include Transaction Capabilities Applications Part ("TCAP") messages to support event "triggers," and queries and responses between ISCP 302 and SSPs 308 and 310.

[043] ISCP 302 may also be, for example, a standard service control point (SCP) or an Advanced Intelligent Network (AIN) SCP. ISCP 302 provides translation and routing services of SS7 messages to support the features of voice network 104, such as call forwarding. In addition, ISCP 302 may exchange information with the service center 106 using TCP/IP or SS7. ISCP 302 may be implemented using a combination of known hardware and software. Although ISCP 302 is shown with a direct connection to service center 106 through ISCP SPACE 314, any number of network elements including routers, switches, hubs, etc., may be used to connect ISCP 302 and service center 106.

[044] STPs 304 and 306 relay SS7 messages within voice network 104. For example, STP 304 may route SS7 messages between SSPs 308 and 310. STP 302 may be implemented using known hardware and software from manufacturers such as NORTEL™ and LUCENT Technologies™.

[045] SSPs 308 and 310 provide an interface between voice network 104 and phones 114 and 120, respectively, to setup, manage, and release telephone calls within voice network 104. SSPs 308 and 310 may be implemented as a voice switch, an SS7 switch, or a computer connected to a switch. SSPs 308 and 310 exchange SS7 signal units to support a telephone call between calling party 120 and

user 110. For example, SSPs 308 and 310 may exchange SS7 messages, such as TCAP messages, within message signal units ("MSU") to control calls, perform database queries to configuration database 312, and provide maintenance information.

[046] Line Information Database (LIDB) 312 comprises one or more known databases to support the features of voice network 104. For example, LIDB 312 may include subscriber information, such as a service profile, name and address, and credit card validation information.

[047] ISCP Service Provisioning and Creation Environment (SPACE) 314 may be included as part of ISCP 302 or be separate from ISCP 302. For example, the Telcordia™ ISCP may include an environment similar to SPACE 314 as part of the product. Further, ISCP SPACE 314 may include one or more servers. ISCP SPACE 314 is the point in the ISCP platform where customer record updates may be made.

[048] In one embodiment, customer records may be stored in ISCP SPACE 314 such that the records may be updated and sent to ISCP 302. These records may include information regarding how to handle calls directed to the customer. For example, these customer records may include information regarding whether or not calls for the customer are to be forwarded to a different number, and/or whether or not the call should be directed to an IP, such as a voice mail system, after a certain number of rings. Additionally, one ISCP SPACE 314 may provide updates to one or more ISCPs 302 via an ISCP network (not shown).

[049]   Additionally, voice network 104 may include one or more recent

change engines 316 such as, for example, an Enterprise Recent Change engine

(eRC); an Assignment, Activation, and Inventory System (AAIS); or a multi-services

platform (MSP). As an example, the eRC and AAIS may be used in voice networks

104 located in the western part of the United States, while an MSP may be used in

networks in the eastern part. The recent change engines may be used to update

switch and ISCP databases. For example, a recent change engine may deliver

database updates to SSPs and to ISCPs, such that when updating databases, these

recent change engines emulate human operators. Additionally, if the instructions

are to be sent to an ISCP 302, the recent change engine may first send the

instructions to ISCP SPACE 314, which then propagates the instructions to ISCP

302 as discussed above. Further, an MSP may be used, for example, for providing

updates to both SSPs 308 or 310 and ISCPs 302. Or, for example, an eRC may be

used for providing updates to SSPs 308 or 310, while an AAIS is used for providing

updates to ISCPs 302.

[050]   Additionally, voice network 104 may include one or more intelligent

peripherals (IP). For example, in Fig. 4, an IP 320 is illustrated as being connected

to SSP 308. These IPs may be used for providing services, such as voice mail

services.

[051]   Fig. 4 is a block diagram of a service center, consistent with the

principles of the present invention. As shown, service center 106 may include

firewalls 402 and 404, one or more digital companion servers 406, one or more

communication portal servers 408, one or more network access servers 410, and a

voice portal 412. Voice portal 412 may include a voice portal application server 414 and a voice recognition server 416. A network 418 may be used to interconnect the firewalls and servers. Additionally, back end server(s) 420 may be provided between service center 106 and voice network 104.

[052] Firewalls 402 and 404 provide security services for communications between service center 106, data network 102, and voice network 104, respectively. For example, firewalls 402 and 404 may restrict communications between user terminal 112 and one or more servers within service center 106. Any security policy may be implemented in firewalls 402 and 404 consistent with the principles of the present invention. Firewalls 402 and 404 may be implemented using a combination of known hardware and software, such as the Raptor Firewall provided by the Axent Corporation. Further, firewalls 402 and 404 may be implemented as separate machines within service center 106, or implemented on one or more machines external to service center 106.

[053] Network 418 may be any type of network, such as an Ethernet or FDDI network. Additionally, network 418 may also include switches and routers as appropriate without departing from the scope of the invention. Further, additional firewalls may be present in network 418, for example, to place one or more of servers 406, 408, 410, or voice portal 412 behind additional firewalls.

[054] Each server (406, 408, 410, 414, 416, 420) may be any type of server or computer, such as a Unix or DOS based server or computer. The servers may implement various logical functions, such as those described below. In Fig. 4, a different server is illustrated as being used for each logical function. In other

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embodiments, the logical functions may be split across multiple servers, multiple servers may be used to implement a single function, all functions may be performed by a single server, etc.

[055] In general, a digital companion server 406 may provide the software and hardware for providing specific services of the service center. Exemplary services include, for example, permitting a customer to add contacts to their address book from a history of calls made or received by the customer, permitting a customer to make calls directly from their address book, scheduling a call to be placed at a specific time, or permitting the customer to look at the name and/or address associated with a phone number. Additionally, these services may include permitting the customer to listen to their voice mail on-line, forwarding their calls based on a scheduler and/or the calling parties number, setting up conference calls on-line, etc. Consistent with principles of the present invention, digital companion server 406 may facilitate acquisition of contact information associated with a caller upon receipt of the caller's telephone number (i.e., a Calling Party Number).

[056] A communication portal server 408 may provide the hardware and software for managing a customer's account and interfacing with customer account information stored by the provider of customer's voice network 104. Network access servers 410 may provide the hardware and software for sending and receiving information to voice network 104 in processing the applications provided by the service center. For example, network access servers 410 may be used for transmitting and/or receiving information from/to an ISCP 302 or an SSP 308 or 310 of voice network 104.

[057] Voice portal 412 includes software and hardware for receiving and processing instructions from a customer via voice. For example, a customer may dial a specific number for voice portal 412. Then the customer using speech may instruct service center 106 to modify the services to which the customer subscribes. Voice portal 412 may include, for example, a voice recognition function 416 and an application function 414. Voice recognition function 416 may receive and interpret dictation, or recognize spoken commands. Application function 414 may take, for example, the output from voice recognition function 416, convert it to a format suitable for service center 106 and forward the information to one or more servers (406, 408, 410) in service center 106.

[058] Fig. 5 illustrates a logical architecture of an exemplary system, consistent with the present invention. As illustrated, the logical architecture may be split into four planes: client side plane 502, application service plane 504, network access plane 506, and the voice network plane 508.

[059] Client side plane 502 includes the user terminals 112_A and 112_B that a user may use to send and/or receive information to/from the service center 106. Additionally, client side 502 includes the user's phone(s) 114. As discussed above, user terminals 112 may be any type of device a user may use for communicating with Service Center 106. For example, user terminal 112_A may be a PDA running a program for communicating with Service Center 106, while user terminal 112_B may be a desktop type computer running a web browser for communicating with Service Center 106 via the Internet. Additionally, the user may

have one or more phones 114, such as, for example, one or more standard landline telephones and/or wireless phones.

[060]   Application service plane 504 includes digital companion server(s) 406, communication portal server(s) 408, and voice portal 412. These entities may communicate between one another using, for example, web services or any other suitable protocols. Web services are a standardized way of integrating Web-based applications using the Extensible Markup Language (XML), Simple Object Access Protocol (SOAP), Web Services Description Language (WSDL) and Universal Description, Discovery and Integration (UDDI) open standards over an Internet protocol (IP) backbone.

[061]   As illustrated, a digital companion server 406 may provide the following functions: a client proxy 512, a web server 514, an application server function 516, a calendar server function 518, a notification server function 520, and a database function 522. Each of these functions may be performed in hardware, software, and/or firmware. Further, these functions may each be executed by a separate server, split across multiple servers, included on the same server functions, or any other manner.

[062]   Client proxy function 512 provides a proxy function for the digital companion that may be used for security purposes. This client proxy function 512 may be included in a separate server such that all communications sent from the other digital companion functions/servers to a user terminal 112 via data network 102 go through client proxy 512. Also, if client proxy 512 is included on a separate

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server, for example, an additional firewall may be provided between client proxy 512 and the other digital companion servers to provide additional security.

[063] Web server 514 provides functionality for receiving traffic over data network 102 from a customer. For example, web server 514 may be a standard web server that a customer may access using a web browser program, such as Internet Explorer or Netscape Communicator.

[064] Application server function 516 encompasses the general functions performed by digital companion server(s) 406. For example, these functions may include interfacing with the various other digital companion functions to perform specific applications provided by the service center. These services may include, for example, interfacing with other function(s), software, and/or hardware to provide a customer with the capability of managing their calls online. For example, permitting a customer to add contacts to their address book from a history of calls made or received by the customer, permitting a customer to make calls directly from their address book, scheduling a call to be placed at a specific time, or permitting the customer to look at the name and/or address associated with a phone number. Additionally, these services may include permitting the customer to listen to their voice mail on-line, forwarding their calls based on a scheduler and/or the calling parties number, setting up conference calls on-line, etc. Consistent with principles of the present invention, application server function 516 may facilitate obtaining contact information associated with a Calling Party Number (CPN) when the customer receives an incoming call from the CPN.

[065] Additionally, application server function 516 may interface with one or more external devices, such as an external web server, for retrieving or sending information. For example, application server function 516 may interface with a voice network's data center 556 (e.g., verizon.com) to determine the services to which the customer subscribes (e.g., call waiting, call forwarding, voice mail, etc.).

[066] Calendar server function 518 may provide the capability of scheduling events, logging when certain events occurred, triggering the application-functions to perform a function at a particular time, etc.

[067] Notification server function 520 provides the capability to send information from service center 106 to a user terminal 112. For example, notification server function 520 at the direction of application server function 516 may send a notification to user terminal 112 that the user is presently receiving a phone call at user's phone 114.

[068] Database function 522 provides the storage of information useable by the various applications executed by the digital companion servers. These databases may be included in, for example, one or more external storage devices connected to the digital companion servers. Alternatively, the databases may be included in storage devices within the digital companion servers themselves. The storage devices providing database function 522 may be any type of storage device, such as for example, CD-ROMs, DVD's, disk drives, magnetic tape, etc.

[069] As discussed above, communication portal server(s) 408 provide the hardware and software for managing a customer's account and interfacing with customer account information stored by the provider of customer's voice network

104. As illustrated in Fig. 5, a communication portal server 408 may provide the

following functions: a web server function 526, an application server function 528, a

contacts database function 530, and/or a customer profile function 532. Each of

these functions may be performed by a separate server, split across multiple

servers, included on the same server functions, or any other manner.

[070] Web server function 526, as with web server function 522 of the digital

companion servers, provides functionality for receiving traffic over data network 102

from a customer. For example, the web server may be a standard web server that a

customer may access using a web browser, such as Internet Explorer or Netscape

Communicator.

[071] Application server function 528 encompasses the general functions

performed by communication portal servers 408. For example, these functions may

include interfacing with the voice network to retrieve and/or modify customer profile

information, and creating and editing an address book for the user. Additionally,

application server function 528 may include the functionality of sending and/or

receiving information to/from external servers and/or devices. For example,

communication portal servers 408 may be connected to a network, such as, the

Internet. Application server function 528 may then provide connectivity over the

Internet to external servers 552 that provide web services, such as the Superpages

webpage. Application function 528 could then contact these external services 552 to

retrieve information, such as an address for a person in the user's address book.

[072] In another example, application server function 528 of communication

portal 408 may interface a single sign on (SSO) server 554. SSO 554 may be used

to allow users to access all services to which the user subscribes, on the basis of a single authentication that is performed when they initially access the network.

[073] Contacts database 530 includes storage devices for storing an address book for the user. This address book may be any type of address book. For example, the user's address book may include the names, phone numbers, and addresses of people and/or organizations. These storage devices may be internal or external to communication portal servers 408 or some combination in between. In addition, these storage devices may be any type of storage device, such as magnetic storage, memory storage, etc.

[074] Customer profile database 532 includes storage devices for storing customer profile information for the user. These storage devices may be the same or separate storage devices used for the contacts database. The customer profile may include information regarding the user's account for their voice network. For example, this information may include the user's name, billing address, and other account information. Additionally, the customer profile may include information regarding voice services to which the user subscribes, such as, for example, call waiting, voice mail, etc.

[075] Additionally, application services plane 504 of the architecture may include a voice portal 412. As discussed above, voice portal 412 may include, for example, a voice recognition function 416 and an application server function 414, and be used for receiving and processing instructions from a customer via voice. The voice recognition function may be implemented using hardware and/or software capable of providing voice recognition capabilities. This hardware and/or software

may be a commercially available product, such as the Voice Application platform

available from Tellme Networks, Incorporated. Application server function 414 of

voice portal 412 may include hardware and/or software for exchanging information

between digital companion servers 406 and voice recognition function 416.

Additionally, application server function 414 may be included on a separate server,

included in the hardware and software providing voice recognition function 416,

included in digital companion servers 406, etc.

[076]   Network Access plane 506 of the architecture includes the functions for

providing connectivity between application service plane 502 and voice network 104.

For example, this plane may include the recent change engines 316, network access

servers 410, and/or back end servers 420.

[077]   As discussed above, recent change engines 316 may be used to

update switches and ISCP databases included in voice network 104. In one

embodiment, recent change engines 316 may include an AAIS 544, an eRC 546,

and/or an MSP 548. Additionally, a proxy 542 may be used between digital

companion servers 406 and recent change engines 542 for security purposes.

[078]   Network access servers 410 may be included in the service center 106

and may provide the hardware and software for sending and receiving information to

voice network 104 in processing the applications provided by the service center. For

example, network access servers 410 may include a Caller ID (CID) functionality for

retrieving caller ID information from voice network 104, a click to dial (CTD)

functionality for instructing an intelligent peripheral (IP) in the voice network to place

a call via an SSP, and/or a real time call management (RTCM) functionality for interfacing with an ISCP of the voice network.

[079]   Network Access plane 506 may also include one or more back end server(s) 420. These back end server(s) 420 may include hardware and/or software for interfacing service center 106 and voice network 104. Back end server(s) 420 may be connected to service center 106 by a network, by a direct connection, or in any other suitable manner. Further, back end server(s) 420 may connect to one or more devices in voice network 104 by a network, a direct connection, or in any other suitable manner.

[080]   Back end server(s) 420 may include, for example, a server providing a voice mail retrieval and notification function. For example, this voice mail retrieval and notification function may include the capability to receive notifications when a user receives a voice mail, physically call a user's voice mail system, enter the appropriate codes to retrieve the voice mail, retrieve the voice mail, convert the voice mail to a digital file, and send it to digital companion servers 406.

[081]   Additionally, back end server(s) 420 may also include, for example, a directory assistance server. This directory assistance server may, for example, interface service center 106 with a Reverse Directory Assistance Gateway (RDA Gateway) of voice network 104. A RDA Gateway is a device for issuing requests to a Data Operations Center (DOC) of voice network 104 for name and/or address information associated with a phone number and receiving the name and/or phone number in response to this request. Additional details of the RDA gateway and DOC are described below in connection with Fig. 6.

[082] In another example, back end server(s) 420 may include a wireless internet gateway that is used for interfacing with a mobile switching center (MSC) of a wireless voice network. As with the above-described back end server(s) 420, this wireless internet gateway may be used for converting requests and information between the formats used by service center 106 and those used by the wireless voice network.

[083] In yet another example, back end server(s) 420 may include a conference blasting server for instructing a conference bridge in voice network 104 to dial out via an SSP to the participants of a voice conference. Or for example, the back end server(s) may include a server for instructing an IP of the voice network to place a call between two parties by dialing out to each of the parties. Back end server(s) 420 may also include the capability to instruct the bridge or IP device to call an audio digitizing device that can listen to the conference, convert the audio signals to digital format, and forward the digitized signals to a user device via, for example, an audio streaming server. The audio streaming server may, for example, allow a user to connect to it via, for example, the Internet. Additionally, the audio streaming device may buffer or record the signals to permit the user to pause, rewind, and/or fast-forward thru the conference.

[084] In yet another example, back end server(s) 420 may include a Single Number Short Message Service (SN SMS) server for interfacing the service center 106 with a SMS gateway in voice network 104. This may be used for example to permit the customer to have SMS messages addressed to their home phone number directed to an SMS capable device of the users chosing.

[085]   Voice network plane 508 includes the hardware and software included in voice network 104, as discussed above with reference to Fig. 3. For example, voice network plane 508 may include ISCP SPACE 314, ISCP 302, intelligent peripherals 320, and SSP 308. Additionally, voice network plane 508 may also include the hardware and software included in a wireless carrier's network, such as, for example, the mobile switching center, etc.

[086]   For clarity of explanation, system 100 is described herein with reference to the discrete functional elements illustrated in Figs. 1-5. However, it should be understood that the functionality of these elements and modules may overlap and/or may exist in a fewer or greater number of elements and modules. Elements of system 100 may, depending on the implementation, lack certain illustrated components and/or contain, or be coupled to, additional or varying components not shown. Moreover, all or part of the functionality of the elements illustrated in Figs. 1-5 may co-exist or be distributed among several geographically dispersed locations.

[087]   In certain embodiments, methods and systems consistent with present invention may perform a Reverse Directory Assistance (RDA) lookup. As used herein, the term "RDA lookup" refers to obtaining contact-related information associated with a party by way of a telephone number or other identifier associated with that party. As used herein, the term "party" encompasses any entity for which contact-related information may be retrieved, such as individuals, groups, businesses, retail establishments, service providers, etc. Consistent with embodiments of the present invention, contact-related information may include one

or more of a name, home address, business address, home telephone number,

business telephone number, cell phone number, instant messenger address, IP

address, biometric information (e.g., fingerprints, voice prints, retinal scans, etc.)

visual information (e.g., digital images, photographs, etc.), audio information,

personal information (e.g., birth date, favorite movies, favorite songs, etc.), public

records, credit reports, police records, driving records, banking statements, and

contact-related information associated with relatives and/or friends. In certain

embodiments, contact-related information may include information associated with,

or retrieved via, one or more networks.

[088] Although a telephone number is used herein to explain principles and

aspects of the present invention, the present invention contemplates the use of other

identifiers to retrieve information associated with parties, such as e-mail addresses,

fax numbers, Caller ID information, predetermined ID codes, network addresses,

photographs, digital images, audio signals, video signals, etc. For example, a photo

of an individual may be used to retrieve contact-related information associated with

that individual.

[089] Consistent with principles of the present invention, an RDA lookup may

be triggered by a Calling Party Number (CPN). For example, upon user 110

receiving (via telephones 114, 116, etc.) a call from a caller (having an associated

CPN), contact information may be obtained for the caller using the received CPN.

Additionally or alternatively, an RDA lookup may used to obtain information

associated with telephone numbers stored in a history (or call log) of incoming

and/or outgoing calls. Further, a user could specify a telephone number for which to

obtain contact information by for, example, inputting the number to user terminal

112. In one embodiment of the present invention, user 110 could initiate an RDA

lookup. Also, one or more systems associated with user 110 (e.g., user terminal 112

and server 406) could automatically initiate an RDA lookup. Consistent with

embodiments of the present invention, contact information may be obtained in order

to add a party to a user's address book or contact list, which may, as mentioned

above, be maintained by contacts database 530.

[090]   Fig. 6 illustrates an environment 600 in which RDA processes

consistent with embodiments of the present invention may be implemented. As

illustrated, environment 600 may include service center 106, data network 102, back

end server 420, an RDA Gateway 610, an RDA proxy server 620, a directory

network 630, a Data Operations Center (DOC) 640, and a listings lexicon 650.

[091]   As mentioned above, back end server 420 may include hardware

and/or software for interfacing service center 106 with voice network 104. In one

example, back end server 420 may include or leverage one or more search engines.

Back end server 420 may be connected to service center 106 via a network (e.g.,

corporate network 675), a direct connection, or in any other suitable manner.

Further, back end server 420 may connect to one or more devices in voice network

104 by a network, a direct connection, or in any other suitable manner. In

environment 600, back end server(s) 420 may include or be configured to operate as

one or more RDA application server(s). As such, back end server 420 may interface

service center 106 with RDA Gateway 610 of voice network 104.

[092] In certain embodiments, one or more firewalls (e.g., firewall 404) may be interposed between back end server 420 and one or more servers within service center 106 to provide security services. Such firewalls may be implemented external to service center 106, as illustrated in Fig. 6, and/or implemented within service center 106.

[093] RDA Gateway 610 may include one or more devices, components and/or processes (e.g., implemented in software, firmware, and/or hardware) configured to facilitate information exchange between back end server 420 and voice network 104. In certain configurations, RDA Gateway 610 may perform routing functions, switching functions, code conversions, and/or protocol conversions. RDA Gateway 610 may, consistent with embodiments of the present invention, accept messages and requests from back end server 420, issue requests/queries for contact information, and provide information, which may include contact information, back to server 420. In one example, RDA Gateway 610 may accept HTTP messages from back end sever 420 and respond to server 420 using XML. Alternatively, the Standard Generalized Markup Language (SGML) and/or any other language that facilitates the creating and sharing of common information formats may be employed. In one embodiment, RDA Gateway 610 may send server 420 a Document Type Definition (DTD), which describes response format(s). In addition, or as alternative to a DTD, any other schema and/or means for validating a language (e.g., XML) may be employed for describing response formats. Additional details of responses are discussed below in connection with Figs. 7 and 8.

[094] As illustrated in Fig. 6, RDA Gateway 610 may be coupled to a directory network 630. Directory network 630 may, in certain implementations, be coupled to or included in voice network 104. Directory network 630 may include any combination of components and/or services configured to provide contact-related information. Directory network 630 may include, for example, Verizon's™ LiveSource National Directory Assistance network and/or any other directory and/or operator service network.

[095] In exemplary implementations, directory network 630 may include or be coupled to DOC 640. DOC 640 may include one or more devices, mechanisms, and/or services for maintaining, and/or processing requests for, contact-related information. In environment 600, DOC 640 may include or be coupled to a lexicon 650, which may be a compilation of contact-related information (e.g., listing information) associated with callers. Lexicon 650 may, for example, be implemented via one or more databases, such as a relational database, a distributed database, and/or an object-oriented programming database. Information included in lexicon 650 may be obtained, maintained, and updated via one or more telephone companies (e.g., Verizon™), listing house sources, and/or operator referrals. Listing information may include, but is not limited to, one or more of: a phone number, name, street, city, state, zip code, non published flag, and billing type (e.g., local or national).

[096] In certain embodiments, environment 600 may include RDA proxy server 620, which may serve as an application level proxy server that allows known/trusted messages to pass between service center 106 and RDA Gateway

610. RDA proxy server 620 may, for instance, log errors and attempts by other devices to gain access to the trusted network segment.

[097] Fig. 7 is a flowchart depicting exemplary stages in an RDA lookup process consistent with embodiments of the present invention. The illustrated process may begin with an RDA lookup request (stage 710). In certain implementations, an RDA lookup request may be initiated by user 110 and/or a device associated with user 110 in response to a user action/input. Initiating (or triggering) an RDA request may involve generating and/or transmitting, as well as causing the generation/transmission of, the request. In one example, user terminal 112 may transmit, in response to instructions received by user 110, an RDA lookup request for a particular telephone number to digital companion server 406 in service center 106. User 110 may, in certain instances, trigger an RDA lookup for a CPN upon viewing a CPN from a caller ID display. Further, a user could trigger an RDA lookup request by for, example, inputting a telephone number to, or selecting a telephone number from, user terminal 112. User 110 may, additionally or alternatively, trigger an RDA lookup by selecting a telephone number from a history of incoming and/or outgoing calls (i.e., a call log), which may be stored, for example, by one or more elements within service center 106 and accessible by user terminal 112. In certain embodiments of the present invention, user 110 may be prompted to initiate an RDA lookup request. For example, server 406 and/or user terminal 112 may prompt user 110 to initiate an RDA request when an outgoing or incoming call occurs or is logged. User 110 may, for instance, initiate an RDA request in order to

add a contact to an address book or contact list (e.g., stored by contacts database 530).

[098] Consistent with embodiments of the present invention, an RDA lookup request may be initiated (stage 710) by a device associated with user 110 automatically, without user action/input and with or without a user's knowledge. In one example, an RDA lookup request may be initiated (e.g., by user terminal 112 and/or server 406) when an incoming call is received by a calling device associated with user 110 (e.g., telephone 114). Additionally, an RDA request could be initiated automatically by user terminal 112 and/or service center 106 (via server 406) when a contact is being added to user 110's contact list. That is, obtaining contact information for a telephone number could be part of the process of adding a contact to the contact list. Consistent with principles of the present invention, incoming and/or outgoing calls may be logged by one or more elements in service center 106 (e.g., server 406), and service center 106 may (e.g., via server 406) automatically initiate RDA requests for such numbers. Such requests may be automatically initiated to add contacts to a user's address book. In certain embodiments, RDA processes may be leverage to update or refresh a user's address book. In such embodiments, RDA lookup requests may be initiated automatically and/or on demand in order to update a user's address book with current contact-related information. In one example, a user may input a command (e.g., via user terminal 112) that initiates one or more RDA lookup requests in order to refresh the address book. Additionally, or alternatively, RDA lookup requests may be periodically initiated, without user intervention, in order to refresh the address book.

[099] After an RDA lookup request is initiated, the request may be forwarded to back end server 420 (stage 720). In certain embodiments, the RDA lookup request may be transmitted from service center 106 (e.g., from server 406) to back end server 420. The RDA lookup request may also be routed through firewall 404. Upon receiving the request, back end server 420 may authenticate the request and transmit an RDA query to RDA Gateway 610 (stage 730). Authenticating the request may be optional.

[0100] In certain embodiments, upon receiving the request (stage 720), back end server 420 may, in addition or as alternative to transmitting an RDA query to RDA Gateway 610, leverage one or more search engines and/or network services (e.g., Google, Super Pages) to retrieve certain contact-related information. In one example, back end server 420 may leverage one or more search engines to retrieve certain contact-related information (e.g., public records from the Internet) and, in addition, transmit an RDA request for other information (e.g., listing information) to RDA Gateway 610. In other examples, back end server 420 may retrieve contact-related information, and RDA Gateway 610 may be unnecessary. In such cases where RDA Gateway 610 is not leveraged, stages 730-750 may not be performed in the process of Fig. 7.

[0101] An RDA query transmitted from back end server 420 to RDA Gateway 610 (stage 730) may, in one implementation, include the telephone number for which contact information is desired and an identifier associated with user 110 (customer ID). As explained above, the telephone number for which contact information is requested may be a telephone number received by user 110 (e.g., a

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calling party number), previously dialed by user 110 (e.g., from an outgoing call history or log), and/or specified/selected by user 110. The customer ID may, for example, include user 110's primary telephone number. In certain embodiments of the present invention, the RDA query may be transmitted or routed from back end server 420 to RDA Gateway 610 through RDA proxy server 620. Back end server 420 may, in certain embodiments, transmit the RDA query to RDA Gateway 610 via HTTP. In one example, the RDA query may be in the form of a Universal Resource Locator (URL) having the following exemplary format:

http://RDAGateway/RDAQuery.aspx?customerID=2129999999&lookupID=2125551212

In the above example URL, *RDAGateway* may be a name or IP address associated with RDA Gateway 610; *customerID* may be the primary telephone of user 110; and *lookupID* may be the telephone on which the query is performed.

[0102] Upon receiving the RDA query, RDA Gateway 610 may forward the query to DOC 640 (stage 740). As described above, DOC 640 may include or be coupled to listing lexicon 650, which may be implemented via one or more database(s). Accordingly, RDA Gateway 610 may query the listing lexicon for contact information associated with the telephone number included in the query. Consistent with principles of the present invention, RDA Gateway 610 may expect a response from listing lexicon 650 as described in an Interface Protocol Specification provided by a database vendor. In response to the RDA query, DOC 640 may provide (e.g., to RDA Gateway 610) listing information associated with the telephone number in the query. For example, a phone number, name, street, city, state, and/or zip code may be returned. Additionally or alternatively, one or more flags and/or errors may be returned. For example, if the particular party associated with the

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telephone number of interest has indicated that contact information is to remain private, a non-published flag may be returned from DOC 640. DOC 640 may also provide an indication of an internal processing error or timeout period expiration. Information provided by DOC 640 may also include a billing type (e.g., local or national) for user 110. Consistent with principles of the present invention, single listings and/or multiple listings may be provided by DOC 640 for a given telephone number. For example, families may list spouses and children separately and with the same number, and small business may list multiple parties with a particular number.

[0103] After sending the RDA query to DOC 640, RDA Gateway 610 may send a response to back end server 420 (stage 750). At this stage, RDA Gateway 610 may also record the customer ID to facilitate billing. The response may, in one example, include (or reflect) information provided by and received from DOC 640. RDA Gateway 610 may, in one configuration, respond to back end server 420 via XML. RDA Gateway 610 may therefore convert/format information received from DOC 640 to an XML message and route the message to back end server 420. As mentioned above, RDA Gateway 610 may send server 420 a Document Type Definition (DTD), which describes response format(s). RDA Gateway 610 may, in certain configurations, support one or more of the following response types: Single Listing, Multiple Listings, Non-Published Listings, No Listing, Invalid Phone Number, Service Not Available, Database Error, Query Timeout. Table 1 of Fig. 8 illustrates the above-mentioned responses and their corresponding conditions; Figs. 9A and

9B collaboratively illustrate XML format 900, which depicts an example XML format for each response.

[0104] Consistent with embodiments of the present invention, the response to back end server 420 may include contact-related information (e.g., listing information) associated with the telephone number of interest, which may be received from DOC 640. For example, the response from Gateway 610 to back end server 420 may include one or more of: a phone number, name, street, city, state, zip code. The response may also include network-related information, public records, family information, images, audio information, etc. In addition, the response may include (or reflect) one or more flags and/or errors, as discussed above.

[0105] In the illustrated process of Fig. 7, back end server 420 may forward RDA lookup results to one or more components in service center 106 (stage 760). For example, such results (e.g., listing information, flags, errors, etc. received from DOC 640 via RDA Gateway 610) may be transmitted to server 406. In addition, or as an alternative, contact-related information retrieved by back end server 420 using one or more search engines and/or network services may be transmitted to server 406. The process of Fig. 7 may then provide user 110 with access to the RDA lookup results (stage 770). Access may, for example, be provided via server 406 and user terminal 112. Providing access to RDA lookup results (stage 770) may involve presenting user 110 with listing information associated with the telephone number of interest. Providing access to RDA lookup results may also involve notifying user 110 that one or more errors occurred or that information is not available (e.g., not published) for the telephone number of interest.

[0106] After access is provided to user 110 (stage 770), user 110 may respond to the RDA lookup results (stage 780). In one example, where listing information is obtained, user 110 may select listing information (stage 780) to add to the contact list. For example, user 110 may input a command to user terminal 112 that causes the listing information to be inserted in the contact list. In certain embodiments, user terminal 112 may, in response to such a command, communicate with service center 106 (e.g., server 406), thereby causing the information to be added to the contact list. In some instances, as mentioned above, multiple listings for a number may be obtained and presented to the user. In such instances, user 110 may select one or more of the listings to add to the contact list. If errors have occurred or information is not available for a particular number, user 110 may initiate another RDA lookup request for the same or different number. In alternative embodiments, user 110 may select listing information for other processing (e.g., by server 406). Responding to results (stage 780) may also involve responding to one or more error messages.

[0107] The steps illustrated in the flowchart of Fig. 7 are consistent with exemplary implementations of the instant invention. Further, it should be understood that the sequence of events described in Fig. 7 are exemplary and not intended to be limiting. Thus, other method steps may be used, and even with the method depicted in Fig. 7, the particular order of events may vary without departing from the scope of the present invention. Moreover, certain steps may not be present and additional steps may be implemented in Fig. 7. In addition, it should be understood that the stages of Fig. 7 may be modified with departing from the scope of the

present invention. For example, in certain implementation, information may be exchanged between DOC 640 and back end server 420 without the use of RDA Gateway 610.

[0108] Embodiments consistent with the invention may be implemented in various environments. Further, the processes described herein are not inherently related to any particular apparatus and may be implemented by any suitable combination of components. Moreover, various types of general purpose devices may be used in accordance with the teachings described herein.

[0109] The exemplary systems and methods consistent with present invention described above are illustrative rather than restrictive. Different combinations of hardware, software, and firmware may be suitable for practicing embodiments of the present invention.

[0110] The present invention has been described in relation to particular examples which are intended in all respects to be illustrative rather than restrictive. Different combinations of hardware, software, and firmware may be suitable for practicing embodiments of the present invention.

[0111] Additionally, other embodiments of the invention will be apparent to those skilled in the art from consideration of the specification and practice of the invention disclosed herein. It is intended that the specification and examples be considered as exemplary only. To this end, it is to be understood that inventive aspects lie in less than all features of a single foregoing disclosed embodiment, implementation, or configuration. Thus, the true scope and spirit of the invention depends on the following claims.